GOVERNMENT OF INDIA
EARTH SCIENCES
LOK SABHA

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Technologies for Natural Calamities
Kumar Shri Kaushalendra;Kumar Shri P.;Misra Shri Ajay (Teni);Sanjar Shri Alok;Senthilnathan Shri PR.;Singh Shri Ravneet

Will the Minister of EARTH SCIENCES be pleased to state:

(a) the details of technologies available to forecast natural calamities such as earthquakes, tsunami, cyclone, drought, flood, hailstorm, abnormal weather, unseasonal rains etc. and also to provide the information to general public and farmers in this regard;

(b) the details of benefits accrued by general public and farmers by the said technologies;

(c) the comparison between the technology used by the country viz-a-viz global standards for the same;

(d) whether the Government proposes to use more advanced technology for the above purpose and if so, the details thereof; and

(e) the other steps taken/being taken by the Government to tackle natural calamities?

Answer

THE MINISTER OF STATE FOR MINISTRY OF SCIENCE AND TECHNOLOGY AND MINISTRY OF EARTH SCIENCES
(SHRI Y. S. CHOWDARY)

(a) India Meteorological Department (IMD) is responsible for monitoring, detection and forecasting of weather including severe weather events such as cyclones, heavy rainfall, extreme temperature etc. It provides forecast of these events at national, regional and state levels through its three tier structure.

In order to provide early warning of severe weather events, IMD has setup a network of state meteorological centres to have better coordination with a state and other agencies.

Improvement of weather forecasting services is a continuous process. Over the last few years, Government has initiated a comprehensive modernization programme for IMD covering upgradation of (i) upgraded observation systems (ii) advanced data assimilation tools (iii) advanced communication and IT infrastructure (iv) high performance computing systems and (v) intensive/sophisticated training of IMD personnel to facilitate the implementation of advanced global/regional/ meso-scale prediction models for improving the accuracy of weather forecasts in all temporal and spatial scales and for quick dissemination of weather forecast assessments/warnings to the users.

Operational implementation of improved forecast suite of models after the commissioning of the High Performance Computing (HPC) systems have enhanced the weather forecasting capacities through assimilating all available global satellite radiance data for the production of forecast products at 22Km grid globally and 9Kms/3Kms grid over India/regional/mega city domains.

IMD has operationalized its location specific nowcasting weather service across the country. This service activity currently covers 156 urban centres on experimental basis under which nowcast of severe weather (Thunderstorms; heavy rainfall from lows/depressions over the land) in 3-6hrs. range is issued. Origin, development/movement of severe weather phenomena are regularly monitored through Doppler Weather Radars (DWRs) and with all available other observing systems (Automatic Weather Station-AWSs; Automatic Rain Gauge - ARGs; Automatic Weather Observing Systems-AWOS; satellite derived wind vectors, temperature, moisture fields etc.)

Recently, under the National Monsoon Mission initiative, other institutions of the Ministry, the Indian Institute of Tropical Meteorology (IITM), Pune, Indian National Centre for Ocean Information Services (INCOIS), Hyderabad and National Centre for Medium Range Weather Forecasting (NCMRWF), NOIDA have embarked upon to build a state-of-the-art coupled oceanatmospheric climate model for a) improved prediction of monsoon rainfall on extended range to seasonal time scale (16 days to one season) and b) improved prediction of temperature, rainfall and extreme weather events on short to medium range time scale (up to 15 days) so that forecast skill gets quantitatively improved further for operational services of IMD.

National Center for Seismology (NCS) is monitoring earthquake activity in and around the county round the clock through its national seismological network. There is no proven scientific technique worldwide exists so far to predict/forecast the occurrence of earthquakes with reasonable degree of accuracy in space, time and magnitude.

Observing systems support for the Indian Tsunami Early Warning Centre (ITEWC) comprises of real-time seismic monitoring network of 17 broadband seismic stations apart from other national and international seismic stations to detect under-sea tsunamigenic earthquakes from the two known subduction zones of Andaman-Sumatra and Makran in Indian Ocean which can potentially affect entire Indian coastal states and Island regions, a network of real-time sea-level sensors with Bottom Pressure Recorders (BPR) in the

open ocean, HF Radars for coastal currents and coastal tide gauge stations to capture tsunami wave speed and amplitude on 24 X 7 basis.

(b) The Government has been entrusting the task of carrying out a comprehensive third party assessment of socio-economic benefits of its services to the reputed National Council of Applied Economic Research (NCEAR), Delhi. As per the recent NCAER report, farming community of the country is using the Gramin Krishi Mausam Sewa (GKMS) service products of IMD for critical farm operations viz. i) Management of sowing (Delayed onset of rains); ii) Changing crop variety (Delay in rainfall); iii) Spraying Pesticides for disease control (occurrence of rainfall); iv) Managing Irrigation (Heavy rainfall Forecast).

Concurrently, with the implementation of District Level Agro-Meteorological Advisory services, India has seen improved agriculture performance in the rain fed farming (covers 60% of arable land). Incremental profit due to GKMS is assessed at 25% of the net income. Potential Annual Economic profit by using GKMS by 24% of the community cultivating 4-principle crops (wheat; paddy; sugarcane; cotton) in 2010 was assessed at Rs. 38,463 Crores (when 2.0 million farmers were subscribed to SMS service), the annual profit rose to Rs.42,000 Crores in 2015 (11.5 million farmers have been subscribed to SMS service), Top11- Principal Crops was assessed as 56,310 Crores and top 28- Principal Crops was assessed as Rs. 67,000 Crores in 2015. The study suggests that GKMS has the potential of generating net economic benefit up to Rs.3.3 lakh crores on the 4-principal crops alone when Agro-Meteorological advisory is fully utilized by 90.3 million dependent households.

(c-e) The technology used by the country is of international standard. Government also feels that the up gradation of the observing system, high performance computing, communication, forecast/warning systems, product dissemination systems etc. should become a part of continuing process by which state-of-the art science and technology tools shall be made accessible to the scientists engaged in weather research and forecasting towards enhancing the service quality.